Petroleum Coke versus Coal

1. Petroleum coke is substituted into boilers designed to combust coals and other solid fuels due to cost. As a byproduct, this replacement fuel in the electric utility means that coal is not mined and the associated cost of mining and the environmental cost of mining is replaced.

2. A higher heat input, a lower ash content, and a lower concentration of metals in the petroleum coke also make it an attractive substitute. This means that for each kilowatt hour of electricity generated there can be lower particulate and metal emissions with petroleum coke combustion.

   For example: The mercury content in petroleum coke listed below is 0.079 parts per million (PPM) as opposed to Eastern coal which is listed as 0.204 PPM. Petroleum coke can be almost 40% lower in mercury based on this information from the application for DTE Monroe power plant.

3. The sulfur content of petroleum coke can run higher than coal. Typically, petroleum coke has a higher sulfur content, ranging from about 4% to 7% sulfur. (On recent applications for new coal-fired boilers, the sulfur content for various coals has ranged from 0.3% to 3.0%.)

4. The same pollution control equipment used to control sulfur dioxide emissions from coal-fired power plants is used to control sulfur dioxide emissions while firing petroleum coke. At DTE Monroe Power plant this is a wet flue gas desulfurization (FGD) system or in other words a wet scrubber.

POLLUTANT[5]	CAS No.	MAXIMUM (90th Percentile) CONCENTRATION, ppm, as-received basis				
		PRB Coal[1]	Eastern Coal[2]	Pet Coke[2, 3]	70/20/10 Blend[4]	90/10 Blend[4]
Antimony (Sb)	7440-36-0	0.79	**2.74**	0.50	1.15	2.52
Arsenic (As)	7440-38-2	7.19	**39.9**	2.97	13.31	36.2
Barium (Ba)	7440-39-3	**511**	79.5	1.78	373	71.7
Beryllium (Be)	7440-41-7	1.15	**4.51**	0.00	1.71	4.06
Cadmium (Cd)	7440-43-9	0.14	**0.87**	0.00	0.27	0.78
Chlorine (as HCl)	7647-01-0	101	**1,280**	99.0	336	1162
Chromium (Cr)	7440-47-3	9.56	**23.8**	1.49	11.6	21.6

POLLUTANT[5]	CAS No.	MAXIMUM (90th Percentile) CONCENTRATION, ppm, as-received basis				
		PRB Coal[1]	Eastern Coal[2]	Pet Coke[2, 3]	70/20/10 Blend[4]	90/10 Blend[4]
Cobalt (Co)	7440-48-4	3.02	**12.8**	0.40	4.71	11.6
Copper (Cu)	7440-50-8	14.4	22.9	24.8	17.1	**23.1**
Fluorine (as HF)	7664-39-3	79.1	**137**	46.5	87.5	128.1
Lead (Pb)	7439-92-1	6.54	**42.0**	3.96	13.4	38.2
Manganese (Mn)	7439-96-5	**86.3**	78.0	29.7	79.0	73.2
Mercury (Hg)	7439-97-6	0.129	**0.204**	0.079	0.139	0.191
Molybdenum (Mo)	7439-98-7	2.66	11.0	442	48.2	**54.0**
Nickel (Ni)	7440-02-0	7.91	49.7	442	59.6	**88.9**
Phosphorus (P)		445.84	**676.8**	0	447.4	609.1
Selenium (Se)	7782-49-2	1.29	**4.76**	0.040	1.86	4.28
Silver (Ag)	7440-22-4	0.086	**1.83**	0.00	0.43	1.65
Thallium (Tl)	1314-32-5	0.791	**7.23**	0.00	2.00	6.50
Vanadium (V)	7440-62-2	23.7	41.7	1268	152	**164**
Zinc (Zn)	7440-66-6	28.3	**155**	67.3	57.6	147

PROXIMATE FUEL DATA		PRB Coal[1]	Eastern Coal[2]	Pet Coke[2, 3]	70/20/10 Blend[4]	90/10 Blend[4]
Heating Value, Btu/lb		8,088	11,441	14,500	9,400	11,747
Ash Content, %		7.6%	10.9%	2.0%	7.7%	10.0%

1. The coal HAP content and proximate fuel data is from the USGS coal quality database, available at http://energy.er.usgs.gov/products/databases/coalqual/intro.htm.
2. The petroleum coke copper, manganese, nickel, vanadium, and zinc contents are from Marathon Ashland.
3. Trace element concentration for all other elements is from Koch Carbon, Inc.
4. The coal blend is based on 70% subbituminous (PRB) coal, 20% eastern coal, and 10% petroleum coke.